A STUDY ON BEHAVIOR BASED SAFETY MANAGEMENT

(With Reference to Visakhapatnam Steel Plant,Visakhapatnam)

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Introduction:

Organizations are becoming increasingly aware of the need to provide a workplace that is not only free of common injuries but one that also protects workers, facilities, and the environment from the consequences of more serious incidents involving safety, security, environmental, and other risks. Considering the human sufferings and economical loss due to accidents, it becomes imperative on the part of every one to prevent the accidents by removing or controlling the hazards in industries. Despite advances in accident prevention and providing safe and healthy environment to the industrial workers, safety at work still needs to find a complete solution.

Accident prevention does not lie on devising safe machines alone but also on improving the knowledge, skill, attitude, behavior and morale of the industrial workers. Therefore a research study on safety management to identify the need for implementation of Behavior Based Safety to enhance total safety culture at Visakhapatnam steel plant is attempted.

Concept of Behavior Based Safety Management (BBSM):

Behavior Based Safety (BBS) is the "application of science of behavior change to real world problems". Behavior Based Safety "focuses on what people do, analyzes why they do it, and then applies a research-supported intervention strategy to improve what people do".

A good Behavior Based Safety program will consist of:

- Common goals
- Definition of what is expected – Specifications of target behaviors
- Observational data collection
- Feedback to associates being observed
- Review

Behavior is variously defined as:

- How a person conducts himself;
- The demeanor and manners of an individual;
- An observable action of a person.

The causes of human behavior are associated with attitude, personality, motivation and memory, together with those physical and mental characteristics which constitute a person and his environment. Behavior Based Safety (BBS) is a process that reduces unsafe behaviors that can lead to incidents occurring in the workplace. Behavior Based Safety management focuses on the identification and modification of critical safety behaviors, and emphasizes how such behaviors are linked to workplace injuries and losses.

Our basic premise is that behavior is a function of the immediate environment. Once we have pinpointed a specific behavior, we can then divide environmental events into two sets of categories: events that precede the behavior and events that follow the behavior. Behavioral psychologists use the terms 'Antecedents' for events that occur before the behavior and 'Consequences' for those that follow behavior.

The relationship between these behavior events is a contingency relationship, that is, an if-then relationship. If the antecedent conditions are present, then the behavior will occur. If the behavior occurs, it will be followed by the consequence.

Behavior Based Safety is a proactive process that helps to get changes in a work group's safe behavior levels before incidents happen. Behavior Based Safety seeks to change the person's mindset, habits and behaviors so that the "at risk" behaviors will not be performed.

Evolution of Behavioral Based Safety Management:

It is difficult to pinpoint precisely the beginning of the field of Behavior Based Safety as it is known today. However, there was a flurry of work starting in the early 1970s. Since its inception and application in the mid-1970s, Behavior Based Safety has undergone a series of evolutionary changes.

Heinrich in 1930s published work describing the results that he derived by evaluating the accidents and came to the conclusion that roughly 90% of all incidents are caused by human error. This conclusion became the foundation of what Behavior Based Safety has come to be today. Moves towards 'cultural' models of Behavior Based Safety should be welcomed by everyone as they tend to achieve the actual results everyone wants: management and workers partnering to enhance and improve the whole safety management system to everyone's benefit.

Importance of Behavioral Based Safety Management:

Behavioral issues are important, because behavior turns systems and procedures into reality. Behavioral interventions can yield both safety and other business benefits if they are implemented properly. Behavior Based Safety Management is an evolving and dynamic field that challenges the ability of even the most seasoned professional to policies, procedure, compliance requirements, and best safety practices.

Evidence drawn from past disasters, such as the incidents at Flixborough, Kegworth and Moorgate, and the Piper Alpha incident indicate that a failure in human behavior was a significant contributory factor. Research has shown that as the safe behaviors increase the safety incidents decrease.

Current safety culture assessment techniques identify general organisational strengths and weaknesses, which are not usually directly linked to specific behaviors. This can limit the identification of specific behaviors which need to be adopted or promoted to enhance a positive safety culture. Everybody who works to reduce accidents and improve safe performance is concerned with human behavior.

Objectives of Behavior Based Safety Management:

A regular focus on actual safety behavior is proactive as it allows other safety-related issues in the accident causal chain to be identified and dealt with before an incident occurs. The purpose of a Behavior Based Safety process is to reduce incidents triggered by unsafe or at-risk behaviors. To achieve this, specific behavioral problems are identified by focusing on incidents that result from the interaction between people and their working environment. Behavioral Based Safety implementation has provided breakthrough levels of improvement in the following areas:

- Reductions in serious injuries
- Reductions in accidental releases of hazardous materials
- Reductions in regulatory agency violations
- Reductions in property damage incidents
- Improved Security preparedness
- Increases in critical tests and inspections conducted on schedule

Need for the Study:

Many companies have spent a lot of time and effort improving safety, usually by addressing hardware issues and installing safety management systems that include regular line management safety audits. Over a number of years these efforts tend to produce dramatic reductions in accident rates. Often, however, a plateau of minor accidents remains that appears to be stubbornly resistant to all efforts to remove them. Although many of these are attributed to peoples' carelessness or poor safety attitudes, most of these are triggered by deeply ingrained unsafe behaviors.

A substantial number of workplace accidents are instigated through unsafe Acts and the unsafe conditions created by the employees in the work place. The employers need to be aware that further reducing accidents can only be achieved by identifying, examining and focusing upon such unsafe behavior or the At- Risk behavior. The steel industry is unique in the sense that it is capital intensive as well as labor intensive process with technology mix available in the industry. The literature review reveals that there is no enough research evidence from India about a comprehensive study in the area of Behavioral Based Safety that has been taken up in the specific sense of a multi-unit integrated steel plant in the public sector in India.

In view of the above, a modest attempt is made to study the safety management to identify the need for implementation of Behavior Based Safety to enhance the total safety culture at RINL, Visakhapatnam Steel Plant, Visakhapatnam.

Profile of the Visakhapatnam Steel Plant:

Rashtriya Ispat Nigam Limited (RINL) - a Navratna Public Sector Enterprise (PSE) with 100% ownership of GOI, is the corporate entity of Visakhapatnam Steel

Plant (VSP) - India's first shore based integrated steel plant, located at Visakhapatnam, which is now in the midst of commissioning the 6.3 MT expansion stage, in line with its Mission of expanding to 20 MT. The production processes can be broadly broken down into three categories: iron making, steel making and product rolling. Production at VSP comprises mainly of long steel products, such as plain wire rods, rebars, rounds and structurals, and semi-finished steel products, such as billets and blooms.

The Indian steel industry is classified into main producers (SAIL, Tata Steel Limited and RINL), major producers (plants with crude steel making capacity above 0.5 MTPA including Jindal Steel Power Limited ("JSPL"), JSW Steel Limited, Essar Steel Limited and JSW Ispat Steel Limited) and other producers.

Iron and steel comprises one of the most important inputs in various sectors of economy of a country. India is currently the fourth largest crude steel producer in the world, according to the Ministry of Steel, Government of India, and is forecasted to be the second largest steel producer by 2016.

Objectives of the Study:

The Main objectives of the present study are:

1. To study and understand the Behavioral Based Safety Management and its relevance to the industries in India.
2. To study the international perspective on Behavioral Based Safety Management.
3. To study the profile of steel industry in global, domestic and Visakhapatnam Steel Plant in particular.

4. To study the Safety Management Practices, the causes of various accidents and assess the Safety Culture prevailing in Visakhapatnam Steel Plant.
5. To analyse the perceptions of the respondents from the various levels of employees in Visakhapatnam Steel Plant in order to understand the existing safety management practices.
6. To suggest strategies and action programmes for further enhancement of the Safety Culture by implementation of Behavioral Based Safety Management at Visakhapatnam Steel Plant.

Methodology:

The present study in based on both primary and secondary data. The following methodology has been adopted to do this work:

- Studying the existing Safety Management System by physical observation and collecting of data by actual visit to the plant facilities.
- Study of important documents / records.
- Gathering of information about Safety Management System and various related issues from the books and journals.
- Gathering of information about all the elements of safety management system and various related information from the internet.

This paper mainly involves a review of literature discussing the roots of various theoretical safety cultural perspectives, differences and similarities, and potential consequences for the understanding of safety and safety interventions.

Primary Data:

The content of the primary data is gathered from the employees through a structured Questionnaire aimed at various aspects as a part of the study. A well structured questionnaire was used for collecting data from target respondents, processing and analyzing the data and arriving at conclusions. The respondents forming an integral part of the source of primary data are the Executives from Junior Manager (E0 Grade) to General Managers (E8 Grade) and the Non-Executives at various levels who are working in the different departments of Visakhapatnam Steel Plant, Visakhapatnam.

Secondary Data:

The content of the secondary data required for the study is obtained from various earlier studies in the relevant field, journals, magazines, text books, various Safety Reports from the intranet portal of SED, accident statistics and investigation reports, safety audit reports, safety inspection reports, annual reports, Steel Industry (JCSSI) report records, and personal manual of Visakhapatnam Steel Plant.

Sampling:

The universe for the present study is a Public Sector Undertaking (PSU) located at Visakhapatnam. It is largely manpower intensified and holds 14,703 permanent employees in this unit. The sample size is calculated after conducting the pilot study using the results obtained from the pilot study and by using the below formula we have selected the sample size as 382.

$$n = \frac{\left(\frac{P[1-P]}{\frac{A^2}{Z^2} + \frac{P[1-P]}{N}} \right)}{R}$$

Where:

n = sample size required
N = number of people in the population
P = estimated variance in population, as a decimal: (0.5 for 50-50, 0.3 for 70-30)
A = Precision desired, expressed as a decimal (i.e., 0.03, 0.05, 0.1 for 3%, 5%, 10%)
Z = Based on confidence level: 1.96 for 95% confidence, 1.6449 for 90% and 2.5758 for 99%
R = Estimated Response rate, as a decimal

As we know the total population is N=14703, based on the pilot study we have estimated the variance in the population as P=50%=0.5, and precision desired is assumed to be A=5%=0.05, and the confidence level assumed is at 95%, then the table value of normal Z=1.96 and the response rate is found to be R=0.95 considering the pilot study.

Hypothesis:

The following hypotheses are formulated for testing the relationship between the variables.

Cadre has no significant impact on all the dimensions related to Safe / unsafe behavior.

There is no significant relation between the dependant variables' dimensions and the independent variable number of dependants.

Educational qualification has significant collision with all the dimensions.

There is no significant relation among the independent variable age with each and every other dimension.

There is no significant change in the opinion of the respondents on all the dimensions related to safe / unsafe behavior with their respective salary.

The opinion of the respondents has no effect on the variables with respect to income.

There is no significant average difference in the opinion of the respondents belongs to different positions with regard to all the dimensions related to safe / unsafe behavior.

Nature of job does not play a vital role on all the dimensions related to safe / unsafe behavior.

Limitations of the Study:

The limitations of the study are stated as follows:

1. While the questionnaire survey administered over such a large respondent sample has been a major strength, it is evident that, on occasions, social desirability effect has contaminated the responses and employees have tended to give rather generalized views on the various items.
2. Another limitation of this study is that the personal bias of respondents may be involved in their opinion of expressions.
3. During the collection of information, it was found that some of the respondent officials were hesitant in providing the desired information and the non response rate is at around 2%.
4. The generalizations of the study cannot be expected to have universal application. Even when one tries to apply to organizations of similar nature, these must be applied with caution. This study being an analysis of Visakhapatnam Steel Plant, its conclusions need not necessarily apply to all steel industries in India.
5. Employees were hard pressed for time in view of the job demands and rigorous work schedule. The researcher had to persuade them for sparing time for responding to the schedule and interviews. When he found that the respondents were not in a position to spare adequate time for the purpose, he had to request them to allot time after the shift timings.
6. However, the above-mentioned limitations do not detract from the quality output of the present study.

Review of Literature:

A Review of Literature is made relating to the identified research problem to know what has been found so far. About sixty eight review of literature is made on the aspects related to general safety management and Behavior Based Safety Management carried in India and abroad.

Presentation of the Study:

The study has been presented in eight chapters. The first chapter “Introduction” deals with the concept, evolution, importance, and objectives of Behavior Based Safety. Besides that, this chapter also explains need for the study, objectives, methodology, sampling and limitations of the study.

The Review of Research and literature has been presented in the second chapter. This chapter outlines a brief review of earlier studies and review of literature. In the third chapter, a brief about the selected organization for the study i.e. Rashtriya Ispat Nigam Limited (RINL), Visakhapatnam Steel Plant (VSP), the scenario of the Indian Steel Industry and that of the global Steel Industry are presented.

The fourth chapter outlines the Indian scenario of Behavior Based Safety Management. The fifth chapter presents the Global scenario of Behavior Based Safety Management. The sixth chapter narrated the different factors of safety management system in Visakhapatnam steel plant. The seventh chapter is concerned with the perceptions of respondents regarding various issues of safety culture.

The eighth chapter describes the summary, findings and Suggestions emanating from the study.